REMARKS

Paragraph 4 of the Office Action indicates that newly submitted Claims 11 and 12 are directed to an invention that is independent and distinct from that which was originally claimed. In particular, Claim 11 is characterized as being drawn to an apparatus including a hydraulic cylinder, ram assembly and flow meter, while Claim 12 is said to be drawn to a method of using a mixer. On page 3, the Office Action indicates that Claims 11 and 12 (Groups II and III) do not share a single general inventive concept with the claims of Group I (Claims 1-5 and 10) because the putative common technical feature in all groups is the recited hydraulic cylinder and ram assembly. The Office Action further states that this feature cannot be a special technical feature under PCT Rule 13.2, because that element is obvious in view of the prior art.

Applicants respectfully traverse the restriction requirement as set forth in item 5 on page 2 of the Office Action on the ground that Claims 1, 11 and 12 are drawn to the same invention, being differentiated only by differences in wording and scope. Moreover, for the reasons set forth hereinafter, Applicants respectfully submit that the stated common technical feature referred to in the Office Action, being the incorporation of a hydraulic cylinder and ram assembly in a manner recited in Claims 1 and 11, for example, is not obvious in view of the prior art. Moreover, Claim 11 has been amended to depend from Claim 1, and merely further limits Claim 1 by reciting a flow meter for measuring a flow of

hydraulic fluid in the hydraulic cylinder and ram assembly for determining the flow of pre-mixed explosive materials. Accordingly, reconsideration and withdrawal of the Restriction Requirement are respectfully requested.

Claims 1, 2, 4 and 10 have been rejected under 35 U.S.C. § 103(a) as unpatentable over Donaghue et al. (U.S. Patent No. 4,369,689) in view Hiorth (U.S. Patent No. 4,191,480) and further in view of Hill et al. (U.S. Patent No. 5,137,366). In addition, Claim 3 has been rejected as unpatentable over Donaghue et al. in view of U.K. patent application GB 2 205 386 A (hereinafter referred to as GB '386), and Claim 5 has been rejected as unpatentable over Donaghue et al. and further in view Pyle (U.S. 4,503,994). Nevertheless, for the reasons set forth hereinafter, Applicants respectfully submit that all claims which remain of record in this application distinguish over the cited references, whether considered separately or in combination.

The present invention is directed to a method and apparatus for filling ordnance with polymer bonded explosive material (PBX), which usually involves the mixing of two materials, including an explosive material (referred to as a pre-mix) and a hardener, which are mixed together immediately prior to use in filling the chosen ordnance. One problem associated with this process, however, is that the mixed PBX composition has a limited shelf life before it cures (that is, hardens). Accordingly, once the hardener and the pre-mix have been combined, the amount of time which can be taken in order to fill the ordnance is limited. If

it hardens before the process is completed, numerous problems occur with PBX having solidified within the pipework, etc.

The present invention addresses and resolves this problem by providing a process in which a pre-mix material and a hardener material are conveyed to a static mixing device via separate pipes. As they enter the mixing device, the two materials are forced through a number of static mixing blades, thereby combining them. Thereafter, the mixed composition is conveyed directly to the ordnance which are to be filled.

According to a feature of the invention, the flow of pre-mix material toward and into the static mixer via a pipe 14 (Figure 1) is controlled by applying pressure to the pre-mix material by means by of a hydraulic cylinder 6 and ram 8 assembly. Under the control of a hydraulic cylinder controller 10, the hydraulic cylinder/ram assembly 6, 8 therefore controls the flow of pre-mix material 12 through the pipe 14, into the static mixer 26. The hardener material 16, on the other hand, is conveyed from a tank 18 to the static mixer via a pump 22 and pipe 24.

With this arrangement, the pre-mix material 2 and the hardener 16 are combined only at the point at which they enter the static mixer, after which the combined composition immediately flows into the ordnance which are to be filled (38). Moreover, the rate at which the PBX material flows into the ordnance from the static mixer is controlled by the fill level controller 42 and the hydraulic

cylinder controller 10 by controlling the application of pressure to the pre-mix material.

The Donaghue et al. reference, on the other hand, discloses a method for mixing an explosive material, which is formed by combining two materials, one being in a liquid form (isocyanite and polyol) and the other being in granular form (ammonium nitrate particles). For this purpose, the ammonium nitrate particulate are stored in a hopper 1 from which they flow into a cylindrical casing 4 that contains a motor-driven auger 2. The liquid materials are injected into the cylindrical casing 4 via a nozzle 6 to form a stream of liquid droplets.

An important aspect of the Donaghue et al. apparatus relates to the proposition that the ammonium nitrate material, which forms the explosive, is in particle form. Thus, at column 3, lines 13-22, the specification states that certain problems regarding build up of foam material in undesirable places or uneven distribution of particles, can be resolved if the process of adding the liquid materials to the particles is performed in such a manner that "the liquid precursor materials for the foam matrix are enveloped in a curtain of solid particles of the inorganic oxygen releasing salt, such as ammonium nitrate . . .." For this purpose, as the ammonium nitrate particles fall through the cylindrical casing 4, they impinge on a cone shaped deflector plate 5 which causes the falling stream of solid particles to assume a hollow cylindrical configuration. (See column 4, lines 35-39.) The nozzle is positioned inside the cylindrical stream of

particles, such that the liquid droplets generated by the nozzle are engulfed by the falling cylindrical stream of particles (Column 4, lines 46-48.) In this manner, the particles become coated with the liquid precursor, so that the mass which collects at the bottom of the apparatus is an even dispersion of ammonium nitrate particles in a matrix of polyurethane precursor. (See also, column 5, lines 13-19.) The flow rate of the stream of liquid droplets and the solid particles is adjusted by controlling the speed of motor 3 which turns the auger 2. (Column 4, lines 48-52.) Alternatively, the auger 2 may be a star feeder or vibratory feeder. (Column 5, lines 8-9.)

As can be seen from the foregoing brief description, the Donaghue et al. apparatus differs from that of the present invention in that it neither teaches nor suggests that a flow of pre-mix explosive material into the static mixer (where it is combined with the hardener) is controlled by a hydraulic cylinder and ram assembly that applies controlled pressure to the pre-mix material itself, prior to mixing in the static mixer. Moreover, any effort to modify the Donaghue et al. apparatus to incorporate such a feature would be highly unlikely to succeed, and could do so only by further inventive effort, due to the unique nature of the technique employed in Donaghue et al., which is specific to combining a stream of particles to a stream of liquid droplets. Given the granular nature of the ammonium nitrate material, as well as the necessity that it be capable of being deflected by the cone shaped deflector plate 5 to form a hollow cylindrical stream, in particular, it is unclear whether or how the application of pressure to the

ammonium nitrate particles could be accomplished without destroying the functionality of the system. Certainly, nothing in Donaghue et al. teaches or suggests such a technique, or that such a technique is even possible.

The Hill et al. reference, on the other hand, discloses a cement mixer of the type that is commonly mounted on a vehicle (that is, a cement truck) in which a hydraulic pump 70 operates a hydraulic ram 74 to raise and lower the forward end of the drum support frame 28 to facilitate unloading the mixed materials (that is, concrete or cement) from the drum 12. (See, for example, column 6, line 67 through column 7, line 25.) That is, in order to unload the drum due to gravitational forces, the latter is raised into an angled dumping position (dashed line in Figure 2), so that the mixed concrete or cement flows out of the drum, after which the hydraulic ram eases the drum 12 back down into the loading and towing horizontal position (Figure 2).

Applicants respectfully submit that nothing contained in Hill et al. teaches or suggests how the Donaghue et al. apparatus might be modified in order to replicate the present invention, in which a flow of one of two constituents into a static mixer is controlled by a hydraulic cylinder and ram assembly that applies pressure to that constituent as it flows towards the mixer. For the reasons noted previously, Applicants respectfully submit that such a modification of Donaghue et al. is not possible. Moreover, even were the two references combined in some manner, the combination would not result in the present invention in that, in

Hill et al. there is no suggestion of applying pressure to one of two constituents as it flows into a mixing vessel. Indeed, there is no disclosure of applying pressure of to any of the materials at all. Rather, the Donaghue apparatus simply raises and lowers one end of the mixing vessel, as noted previously. Moreover, to the extent that the hydraulic pump and ram assembly in Hill et al. causes a flow of material, it does so by causing the concrete to flow out of the mixing drum, after it has been mixed. Accordingly, Hill et al. fails to provide those elements of the invention, referred to previously, which are missing in Donaghue et al. Specifically, it does not teach or suggest that a flow of one of two constituents which are being combined towards the static mixer is controlled by a hydraulic cylinder and ram assembly that is coupled to apply controlled pressure to that one constituent.

The Hiorth reference, on the other hand, has been cited as disclosing a static mixer for mixing of materials from two reservoirs, substantially at the inlet of the static mixer. Insofar as Applicants have been able to determine, like the Hill et al. reference, Hiorth contains nothing which suggests a modification of the apparatus in Donaghue et al. which would replicate the invention of Claim 1.

Finally, the GB '386 reference has been cited only as disclosing an explosive mixer that utilizes a static mixer and channels the output into cartridge shells or other ordnances, and Pyle has been cited as disclosing a fiber-optic liquid level sensing device. Accordingly, neither of these references teaches

or suggests a modification of Donaghue et al. or any of the other references which would replicate the present invention.

Applicants note that while the foregoing discussion has been directed to primarily Claim 1, method Claim 12 contains the same special technical feature, being that the flow of pre-mix towards the static mixer is controlled by using a hydraulic cylinder and ram assembly to apply controlled pressure to the pre-mix material. Accordingly, Claim 12 distinguishes over the cited prior art for the same reasons set forth above with regard to Claim 1.

If there are any questions regarding this amendment or the application in general, a telephone call to the undersigned would be appreciated since this should expedite the prosecution of the application for all concerned.

If necessary to effect a timely response, this paper should be considered as a petition for an Extension of Time sufficient to effect a timely response, and please charge any deficiency in fees or credit any overpayments to Deposit Account No. 05-1323 (Docket #038665.55361US).

Respectfully submitted,

September 28, 2006

Gary R. Edwards
Registration No. 31,824

CROWELL & MORING LLP
Intellectual Property Group
P.O. Box 14300
Washington, DC 20044-4300
Telephone No.: (202) 624-2500
Facsimile No.: (202) 628-8844
GRE:pjc
dn#286512